ISSN 2304-3415, Russian Open Medical Journal
2022. Volume 11. Issue 4 (December). Article CID e0408
DOI: 10.15275/rusomj.2022.0408

Original article

Coping strategies in young healthy individuals with type D personality

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Received 8 January 2021, Revised 27 June 2022, Accepted 26 August 2022

Abstract: *Objective* — To study the choice of coping strategies and coping intensity in healthy individuals with type D personality.
Material and methods — The study included 98 students of Kemerovo State Medical University (KemSMU), 68 women and 30 men (their mean age was 19.1±2.0 years). All subjects filled out psychological questionnaires to identify type D personality (DS-14) and the choice of coping strategies (Ways of Coping Questionnaire (WCQ) and Coping Strategy Indicator (CSI)).
Results — The participants were divided into a group with type D personality (n=44) and without it (n=54). Individuals with type D personality had higher scores on the Escape-Avoidance (p<0.001), Accepting Responsibility (p=0.009) and Distancing (p=0.05) scales of the WSQ questionnaire, and Avoidance strategy scale of the CSI questionnaire (p=0.007). Students with type D personality were characterized by a pronounced preference for the Escape-Avoidance strategy (p=0.000018). An increase of 1 point in the values on the Escape-Avoidance scale improved the chance of identifying type D personality by 1.15 times (p<0.001). An increase in scores on the Positive Reappraisal scale reduced the likelihood of identifying type D personality (OR 0.98; p=0.005). The Escape-Avoidance coping strategy was rather strongly associated with type D personality (AUC=0.779).
Conclusion — In healthy young people with type D personality, inadequate coping strategies were notably prevalent: the Escape-Avoidance strategy identified by WCQ, and the Avoidance strategy marked by the CSI. The Escape-Avoidance strategy was independently associated with type D personality, and the Positive Reappraisal strategy was associated with the non-D type.

Keywords: type D personality, coping strategies.

Cite as Sumin AN, Prokashko IYu, Shcheglova AV. Coping strategies in young healthy individuals with type D personality. *Russian Open Medical Journal* 2022; 11: e0408.

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Introduction

The patient-oriented approach is one of the major trends in modern medicine. Personalized medicine is a multifaceted concept that includes various components, including genetic predisposition of an individual, comorbidity, gender characteristics, and psychological and personal characteristics of patients [1]. Among the latter, type D personality is distinguished, characterized by a combination of negative affectivity and suppression of its manifestations in external interactions (social inhibition) [2]. Such people are characterized by a predisposition to psychological distress (including anxiety and depression), and this personality type is referred to as one of the psychological risk factors for cardiovascular diseases [3, 4], associated with reduced quality of life [5] and poor prognosis. Additional analysis showed the heterogeneity of the type D influenced the prognosis depending on the stage of the disease development (CAD or CHF), age, and used endpoints [6]. In addition, ethnic, geographic and socioeconomic factors, along with cross-cultural differences [7], could also affect the predictive value of type D personality, as shown by a number of studies in Asian countries and Russia, the data on which were summarized in a recent review [8]. At present, the following question seems to be the most urgent: is it possible to influence patients with type D personality to improve the prognosis? Information about possibility of changing this personality type during dynamic observation of patients remains contradictory: some studies consider it stable [9], while other studies noted its change after rehabilitation measures [10]. As a result, there is a need to search for other strategies that could improve their prognosis in the treatment of patients with type D personality. In this regard, the use of stress-limiting interventions, as well as impacting the inadequate coping strategies, look promising [8]. Since coping strategies are a stabilizing factor, due to which the psychosocial adaptation of an individual is maintained during the period of exposure to stress, and they can be considered as a potential target for behavioral interventions [11]. This explains the recent interest in the study of coping strategies in people with type D personality [12-14]. However, such publications are scarce, and the studies were carried out in foreign countries differing from Russia in their cultural, economic and linguistic environment. Since the results of these studies cannot be directly extended to patients in Russian Federation, the goal of our study was to examine the choice of coping strategies and coping tension in young healthy individuals with type D personality.

Material and Methods

Participants' characteristics and research design

The study included 98 healthy 2nd year students of Kemerovo State Medical University (KemSMU), 68 women and 30 men. Their mean age was 19.1±2.0 years. The assessment of their health level was previously described [7]. All studies were conducted in laboratory settings in the morning hours (from 8.00 to 12.00), with good overall health condition and performance capability. The examination was carried out at least two hours after a light breakfast or on an empty stomach, as well as at least one month after recovering from any acute illness. All surveyed subjects completed psychological questionnaires to identify predisposition to psychological distress and the choice of coping strategies. Individuals with identified type D personality and without it were then distributed among two groups that were compared according to their established coping strategies. The study was approved by the institutional ethics committee and was carried out in accordance with the Declaration of Helsinki. All students participating in the study signed written informed consent forms.

Type D personality

To determine the type D personality, a validated Russian-language version of the DS-14 questionnaire was employed [15]. The questionnaire contains 14 multiple choice questions with the following answer options: incorrect, rather incorrect, difficult to say, perhaps true, absolutely true. Each answer has its own score. If the cumulative score on the Negative Affectivity (NA) and Social Inhibition (SI) scales was 10 points or more, type D personality was established.

Evaluation of coping strategies

The Ways of Coping Questionnaire (WCQ), developed by S. Folkman and R. Lazarus, adapted by L.I. Wasserman et al. [16], was used to diagnose coping strategies. The questionnaire contains 50 different options for behavior in a problematic or difficult life situation. The subject is offered to choose one of the offered statements (never, rarely, sometimes, often) to assess the frequency of using the described behavior. These statements are graded on a 4-point system and are grouped into the following scales: confrontive coping, planful problem solving, self-controlling, positive reappraisal, accepting responsibility, distancing, seeking social support, escape-avoidance. *Confrontive Coping* involves aggressive behavior in order to change the state of affairs, hostility, and a willingness to take risks. *Planful Problem Solving* coping strategy is characterized by an activity that includes analysis and development of algorithms for solving a problem. *Self-Controlling* coping strategies are based on efforts to regulate and control one's emotions and actions. *Positive Reappraisal* includes efforts to find positive moments in a problematic or difficult life situation. *Accepting Responsibility* strategy builds on the awareness of one's own role in the problem and possible ways to solve it. *Distancing* involves efforts to separate oneself from a problematic situation and reduce its significance. *Seeking Social Support* strategy is about asking others for help. *Escape-Avoidance* is characterized by efforts aimed at avoiding a difficult life situation. Processing of raw indicators was performed by transferring them to standard T-scores separately for male and female participants in accordance with their age. In addition, the degree of expressiveness of a particular coping strategy for the respondent were defined as rare use, moderate use, or a pronounced preference for the corresponding strategy.

The Coping Strategy Indicator (CSI), adaptation of N.A. Sirota et al. [17], determined the dominant coping strategies of the individual. This technique allows to distinguish three fundamental groups of coping strategies: *Problem Solving*, when a person identifies a problem and finds effective ways to solve it; *Seeking Social Support*, i.e., an appeal to others for emotional help (sympathy, understanding), informational help (useful information, advice), and material support; an *Avoidance* strategy helps reducing emotional stress via avoiding a problematic situation. The questionnaire contains 33 judgments, to which the respondent gives the following answer options: fully agree, agree, or disagree. Answers are scored on a 3-point system. The scales are labeled with different levels of use of the dominant coping strategies of the personality: very low, low, medium, or high.

Table 1. General characteristics of healthy students with type D personality and without it

	Type D personality (n=44)	*Non-type D personality (n=54)*	*p*
Age, years	19.0 (19.0; 20.0)	19.0 (19.0; 20.0)	0.20
Male (n, %)	9 (20.45)	21 (38.89)	0.48
Results of the DS-14 questionnaire			
SI, points	13.5 (12.0; 15.5)	9.0 (7.0; 13.0)	<0.001
NA, points	16.0 (11.0;18.5)	6.5 (4.0; 10.0)	<0.001
Results of Ways of Coping Questionnaire			
Confrontive coping, points	56.0 (51.0;67.0)	56.0 (51.0;63.0)	0.70
Distancing, points	58.5 (55.0;65.0)	56,0 (52,0;64,0)	0.05
Self-controlling, points	55.0 (51.0;59.0)	52.0 (45.0;59.0)	0.08
Seeking social support, points	51.5 (47.0;56.0)	52.0 (43.0;57.0)	0.75
Accepting responsibility, points	59.5 (55.5;62.0)	55.0 (47.0;61.0)	0.009
Escape-avoidance, points	66.0(60.5;71.0)	55.5 (50.0;63.0)	<0.001
Planful problem solving, points	56.0 (47.0;59.0)	53.0 (47.0; 60.0)	0.90
Positive reappraisal, points	53.0 (48.0;58.0)	56.0 (53.0;61.0)	0.06
Results of the Coping Strategy Indication questionnaire			
Problem solving strategy, points	25.0 (20.5;27.0)	24.0 (22.0;28.0)	0.70
Seeking social support strategy, points	22.0 (16.5;23.0)	21.0 (17.0;24.0)	0.90
Avoidance strategy, points	20.0 (17.0;23.0)	18.0 (15.0;21.0)	0.007

NA, negative affectivity sum score; SI, social inhibition. Quantitative changes are presented as median and quartiles – Me (LQ; UQ).

Table 2. Coping strategies in groups with and without personality type D according to the Coping Strategy Indicator questionnaire

	Type D personality (n=44)	*Non-type D personality (n=54)*	*p*
Problem solving strategy			
Very low level of strategy use	2 (4.55)	0	0.11
Low level of strategy use	10 (22.73)	11 (20.37)	0.77
Average level of strategy use	32 (72.73)	40 (74.07)	0.88
High level of strategy use	0	3 (5.56)	0.11
Seeking social support strategy			
Very low level of strategy use	4 (9.09)	5 (9.26)	0.97
Low level of strategy use	12 (27.27)	15 (27.78)	0.95
Average level of strategy use	25 (56.82)	30 (55.56)	0.90
High level of strategy use	2 (4.55)	4 (7.41)	0.55
Avoidance strategy			
Very low level of strategy use	4 (9.09)	17 (31.48)	0.007
Low level of strategy use	32 (72.73)	33 (61.11)	0.22
Average level of strategy use	4 (9.09)	3 (5.56)	0.49
High level of strategy use	4 (9.09)	1 (1.85)	0.10

Table 3. Coping strategies in groups with and without type D personality according to the Ways of Coping Questionnaire

	Type D personality (n=44)	*Non-type D personality (n=54)*	*p*
Confrontive coping			
Rare use of strategy	2 (4.55)	1 (1.85)	0.44
Moderate use of strategy	24 (54.55)	35 (64.81)	0.30
Strong preference for strategy	18 (40.91)	18 (33.33)	0.43
Distancing			
Rare use of strategy	1 (2.27)	2 (3.7)	0.68
Moderate use of strategy	22 (50.0)	35 (64.81)	0.13
Strong preference for strategy	21 (47.73)	17 (31.48)	0.10
Self-controlling			
Rare use of strategy	1 (2.27)	6 (11.11)	0.09
Moderate use of strategy	34 (77.27)	41 (75.93)	0.87
Strong preference for strategy	10 (22.73)	7 (12.96)	0.20
Seeking social support			
Rare use of strategy	4 (9.09)	8 (14.81)	0.38
Moderate use of strategy	35 (79.55)	41 (75.93)	0.66
Strong preference for strategy	6 (13.64)	5 (9.26)	0.49
Accepting responsibility			
Rare use of strategy	1 (2.27)	8 (14.81)	0.03
Moderate use of strategy	23 (52.27)	30 (55.56)	0.74
Strong preference for strategy	20 (45.45)	16 (29.63)	0.10
Escape-avoidance			
Rare use of strategy	-	1 (1.85)	0.36
Moderate use of strategy	11 (25.0)	36 (66.67)	0.00004
Strong preference for strategy	33 (75.0)	17 (31.48)	0.000018
Planful problem solving			
Rare use of strategy	5 (11.36)	4 (7.41)	0.40
Moderate use of strategy	32 (72.73)	41 (75.93)	0.71
Strong preference for strategy	7 (15.91)	9 (16.67)	0.90
Positive reappraisal			
Rare use of strategy	3 (6.82)	1 (1.85)	0.21
Moderate use of strategy	33 (75.0)	37 (68.52)	0.47
Strong preference for strategy	8 (18.18)	16 (29.63)	0.18

Table 4. Association of coping strategies with the type D personality in healthy students according to logistic regression analysis

	OR (95 % CI)	*p*
One-way analysis		
Scales of the Ways of Coping Questionnaire		
Confrontive coping	1.01 (0.97-1.05)	0.53
Distancing	1,04 (1,0-1.09)	0.042
Self-controlling	1.05 (1.0-1.11)	0.032
Seeking social support	1.01 (0.97-1.06)	0.403
Accepting responsibility	1,07 (1,01-1,12)	0.0092
Escape-avoidance	1.13 (1.07-1.2)	0.00002
Planful problem solving	0.99 (0.95-1.04)	0.9005
Positive reappraisal	0.94 (0.9-0.99)	0.0428
Scales of the Coping Strategy Indicator questionnaire		
Problem Solving strategy	0.96 (0.86-1.07)	0.525
Seeking Social Support strategy	0.99 (0.91-1.07)	0.842
Avoidance strategy	1.12 (1.02-1.24)	0.014

OR, odds ratio; CI, confidence interval.

Statistical analysis

Statistical data processing was carried out using the standard software programs, STATISTICA 10.0 and SPSS 17.0. The Shapiro-Wilk test was employed to assess the normal distribution of quantitative variables. Due to the fact that the examined distribution differed from normal, quantitative indicators are presented in the form of a median and quartiles (25th and 75th percentiles). To compare the groups with each other, the Mann-Whitney test and $\chi 2$ (chi-squared test) were used. For a small number of observations, Fisher's exact test with Yates continuity correction was used. To assess the relationship of a binary trait (presence of type D personality) with quantitative traits (points on the WSQ and CSI scales), logistic regression analysis was used. To identify variables independently associated with the presence of type D, the method of stepwise inclusion based on maximum likelihood was used. Additional analysis of the obtained binary classifications was carried out using ROC curves with an estimate of the AUC indicator. The level of critical significance (p) was assumed equal to 0.05.

Results

Participants' characteristics

General characteristics of students are presented in *Table* 1. The surveyed students, according to the results of the DS-14 questionnaire, were divided into two groups: with type D personality (n=44) and without type D personality (n=54). The groups were comparable in terms of their age (p=0.2) and gender (p=0.48). Nevertheless, the gender difference in prevalence of type D is apparent: 20.4% of all subjects with type D were men, while 79.6% were women. The mean scores on the NA and SI subscales were higher in students with type D personality, compared with those without type D (16.0 and 13.5 points and 6.5 and 9.0 points, respectively, p<0.001 in both cases). Individuals with type D personality had also significantly higher scores on the *Escape-avoidance* (p<0.001), *Accepting responsibility* (p=0.009), *Distancing* (p=0.05) scales of the WSQ questionnaire and *Avoidance strategy* (p=0.007) scale of CSI questionnaire.

Evaluation of coping strategies in the surveyed groups

Express diagnostics of the coping strategies assessment was carried out with the help of The Coping Strategy Indication. It showed that healthy students with type D personality, as well as healthy students without type D personality, used the *Problem solving* coping strategy most often, the strategy of *Seeking social support* to a lesser extent, and the *Avoidance strategy* much less often (72.7%, 61.4%, 18.2% and 79.6%, 63.0%, 7.4%, respectively) (*Table* 2). However, students with type D personality, compared with students without type D personality, used the *Problem solving* strategy less frequently (27.3% of the type D participants reported low, and 20.4% admitted very low level of use), and the *Avoidance strategy* more often (medium and high level of use was reported by 18.2% and 7.4%, respectively). At the same time, a very low level of the *Avoidance* strategy use was 9.09% among students with type D personality, while being significantly higher among students without type D personality, 31.48% (p=0.007).

Analysis of the WCQ questionnaire results showed that medical students use a wide range of coping ways. As can be seen from the presented results (*Table* 3), students with type D personality were characterized by a pronounced preference for the *Escape-avoidance* strategy (75.0%) compared with students without type D personality (31.48%, p=0.000018). Also, subjects with type D personality exhibited a pronounced preference for the *Confrontative coping* (40.9% and 33.3%), *Distancing* (47.7% and 31.5%) and *Accepting responsibility* (45.5% and 29.6%) strategies more often; however, these differences did not have statistical significance. A pronounced preference for the *Positive reappraisal* strategy was rare in both groups, but somewhat more often in the non-D personality type group (29.6% and 18.2%).

Table 5. Results of multiple logistic regression of the coping strategy association with type D personality

		Variables in the Equation					
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Escape-Avoidance	0.127	0.030	18.242	1	0.000	1.136
	Constant	-7.917	1.831	18.690	1	0.000	0.000
Step 2[b]	Escape-Avoidance	0.140	0.032	18.861	1	0.000	1.150
	Positive Reappraisal	-0.071	0.029	6.137	1	0.013	0.932
	Constant	-4.812	2.202	4.775	1	0.029	0.008

a. Variable(s) entered on step 1: Escape-Avoidance (Ways of Coping Questionnaire); b. Variable(s) entered on step 2: Positive Reappraisal (Ways of Coping Questionnaire).

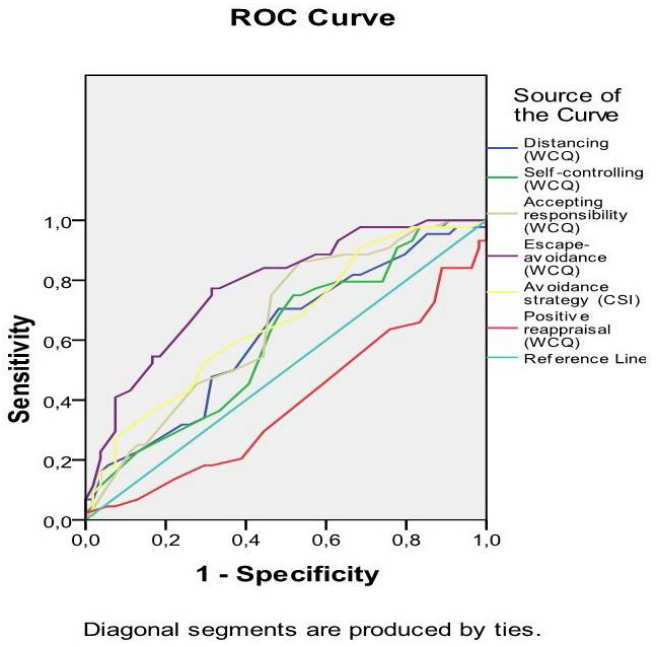

Figure 1. ROC-curves of coping strategy association with type D personality. WCQ, Ways of Coping Questionnaire; CSI, Coping Strategy Indicator.

Association of coping strategies with type D personality sensu the logistic regression analysis

According to univariate logistic regression analysis (*Table* 4), type D personality was associated with an increase in scores on the *Distancing, Self-controlling, Accepting responsibility, and Escape-avoidance* scales of the WSQ questionnaire and the *Avoidance strategy* scale of the CSI questionnaire, as well as with a reduction in points on the *Positive reappraisal* scale of the WSQ questionnaire. The results of multiple stepwise regression analysis are presented in *Table* 5. The presence/absence of type D personality was used as the dependent variable, and the scores on the coping strategies were used as independent variables. Only two scales of the WSQ questionnaire were independently associated with the presence of type D personality. For instance, an increase of 1 point in the values on the *Escape-avoidance* scale augmented the chance of identifying personality type D by 1.15 times (95% CI 1.07-1.23; p<0.001). On the contrary, an increase in scores on the *Positive reappraisal* scale reduced the likelihood of identifying type D personality (OR 0.98; 95% CI 0.86-0.98; p=0.005).

Additional ROC analysis showed that the identified association of the *Escape-avoidance* coping strategy with type D personality had rather high values (AUC=0.779; 95% CI 0.688-0.870), in contrast to other scales included in the multiple logistic regression model (*Figure* 1).

Discussion

The main result obtained in our study is that healthy students with type D personality нав a predominance of inadequate coping strategies, with a particularly pronounced preference for the *Escape-avoidance* strategy.

Until now, coping strategies in people with type D personality have been little studied. A Chinese study found that patients with coronary artery disease (CAD) with type D personality used the *Confrontive coping* strategy less often (16.90±5.39 vs. 20.88±4.95; p<0.001) and the *Acceptance-Resignation* strategy more often (10.16±3.50 vs. 8.35±3.48; p<0.05) than patients without type D personality. At the same time, there were no significant differences between the groups on the *Avoidance* subscale (14.74±6.03 vs. 14.15±5.82, p> 0.05) [18]. As we can see, although the prevailing coping strategy for type D personality persons in the work by Yu et al. was also maladaptive, its characteristics differed from our study (*Acceptance-Resignation* and *Escape-Avoidance*, respectively). Possible explanations for such difference could be differences in the studied cohorts. Ethnic factor may matter as well. As the Chinese authors noted, the traditional Chinese attitude of '*being at ease under any circumstance'* may have promoted the use of the *Acceptance-Resignation* strategy among Chinese patients. Accordingly, patients with type D personality defined the disease as stressful and uncontrollable, and they felt hopeless. Therefore, these patients tended to perceive the disease as the end of their life rather than actively seeking treatment and support, and this could explain their poor adherence to the treatment [19]. Also, Yu examined patients with coronary artery disease, whose views on stress and options for overcoming it may have differed from the reactions of young healthy students. In a survey of young healthy individuals conducted in Britain, type D personality was characterized by such maladaptive coping strategies as *Resignation* and *Withdrawal* [19]. These results were more consistent with our data, although the different questionnaires used to assess coping strategies made it difficult to compare the obtained data.

The very fact of using inadequate strategies to cope with stress could account for the mechanism of the type D personality negative influence on the patient's prognosis. This explains the previously obtained data on the absence of increased stress reactivity in people with type D personality [7, 20]; an inadequate response is manifested by a subjective feeling of an increased level of stress [19]. Besides, identifying inappropriate coping strategies could be a target for subsequent behavioral interventions; in particular, individuals with type D personality could be helped to develop new adaptive coping strategies. This would allow them coping with the stressful situation more effectively and, in turn, could reduce the negative clinical consequences of type D personality.

However, at least two questions should be answered before implementing a widespread clinical application of this approach. First, to what extent are the negative clinical and prognostic effects of type D personality based on inadequate coping strategies? So far, there is no answer to this question. For

example, in the already mentioned study by Polman R et al [19], inadequate coping strategies mediated the negative effect of type D on burnout symptoms. Also, these strategies fully determined the effect of type D on perceived health (both physical and psychological components) in CAD patients [18]. A recent work has shown that cognitive assessment of threats and problems, as well as *Acceptance-Resignation* coping, partially mediated the association of type D personality with major adverse cardiac events (MACE) after percutaneous coronary intervention (PCI) [14]. This study provided a theoretical basis for understanding the mechanism underlying the effect of type D personality on the MACE development, and can serve as a guideline for behavioral influences. The second question is regarding the following issue: to what extent is development of positive coping strategies possible in subjects with type D personality, and, ultimately, can such impact affect the clinical results? There are no answers to these questions yet. It has been suggested that the development of adequate coping strategies in individuals with type D personality would help preventing the development of depressive reactions [13]. Apparently, the reluctance of people with type D personality to seek help (fear of social interactions) complicates the establishment of full-fledged contact between the psychotherapist and the patient, which is a necessary condition for an effective work with psychosomatic diseases [21]. Perhaps that explains why many studies suggested that type D personality deserves targeted behavioral influences, but there are virtually no examples of successful therapy in such patients. A pilot study by Kim SR et al. [10] that examined the use of a lifestyle intervention program based on type D personality in a group of obese women, was somewhat optimistic about this issue. After the intervention in the main group vs. the control group, body weight and body mass index, as well as manifestations of psychological stress and type D personality significantly decreased. Perhaps, within the framework of an integrative interdisciplinary psychosomatic approach with the participation of both representatives of somatic medicine and psychotherapists [21], it would be possible to achieve the implementation of such tasks, but this requires further research.

Conclusion

Inadequate coping strategies prevailed in young healthy individuals with type D personality, compared with individuals without type D: these were the *Escape-avoidance* strategy sensu Ways of Coping, and the *Avoidance strategy* sensu Coping Strategy Indicator. In logistic regression analysis, the *Escape-avoidance* strategy was independently associated with personality type D, and the *Positive reappraisal* strategy was associated with the non-type D personality. The results of this study may allow in the future developing an adequate strategy of behavioral interventions in people with type D personality, and improving their clinical condition and prognosis.

Study limitations

This study has several limitations. First, the sample size was relatively small, although this did not prevent us from obtaining significant relationships between type D personality and various coping strategies. Also, we studied type D personality as a dichotomous variable, but in fact this indicator was characterized by two scales, and it was quite possible that coping strategies were affected by high values on one scale, for example, social suppression. Therefore, in order to test the effect of high values on individual scales of the DS-14 questionnaire in further studies, it is advisable to distinguish not only groups with type D personality and non- type D personality, but also distinct groups with a high level of negative affectivity and social inhibition [22]. Finally, the cross-sectional nature of our study did not allow making a conclusion about the causal relationship between type D personality and the coping strategies.

Conflict of interest

All authors declare no conflicts of interest.

Funding

The study was carried out within the framework of the Comprehensive Scientific and Technical Program of the full innovation cycle, 'Development and Implementation of Technology in the Field of Exploration and Production of Solid Minerals, Ensuring Industrial Safety, Bioremediation, Creating New Products via Deep Processing from Raw Coal Materials while Consistently Reducing the Environmental Impact and Risks to the Population' (approved by the Order of the Russian Federation Government No. 1144-r on May 11, 2022).

References

1. Pogosova N, Saner H, Pedersen SS, Cupples ME, McGee H, Höfer S, et al. Cardiac Rehabilitation Section of the European Association of Cardiovascular Prevention and Rehabilitation of the European Society of Cardiology. Psychosocial aspects in cardiac rehabilitation: From theory to practice. A position paper from the Cardiac Rehabilitation Section of the European Association of Cardiovascular Prevention and Rehabilitation of the European Society of Cardiology. *Eur J Prev Cardiol* 2015; 22(10): 1290-306. https://doi.org/10.1177/2047487314543075.
2. Denollet J. DS14: Standard assessment of negative affectivity, social inhibition, and Type D personality. *Psychosom Med* 2005; 67(1): 89-97. https://doi.org/10.1097/01.psy.0000149256.81953.49.
3. Kupper N, Denollet J. Type D personality as a risk factor in coronary heart disease: A review of current evidence. *Curr Cardiol Rep* 2018; 20(11): 104. https://doi.org/10.1007/s11886-018-1048-x.
4. Raykh OI, Sumin AN, Kokov AN, Indukaeva EV, Artamonova GV. Association of type D personality and level of coronary artery calcification. *J Psychosom Res* 2020; 139: 110265. https://doi.org/10.1016/j.jpsychores.2020.110265.
5. Miller JL, Thylén I, Elayi SC, Etaee F, Fleming S, Czarapata MM, et al. Multi-morbidity burden, psychological distress, and quality of life in implantable cardioverter defibrillator recipients: Results from a nationwide study. *J Psychosom Res* 2019; 120: 39-45. https://doi.org/10.1016/j.jpsychores.2019.03.006.
6. Kupper N, Denollet J. Explaining heterogeneity in the predictive value of type D personality for cardiac events and mortality. *Int J Cardiol* 2016; 224: 119-124. https://doi.org/10.1016/j.ijcard.2016.09.006.
7. Sumin AN, Prokashko IYu, Shcheglova AV. Personality type D, stress reactivity and autonomic balance in healthy young people: Gender and ethnic characteristics. *Arterial Hypertension* 2020; 26(6): 665-675. Russian. https://doi.org/10.18705/1607-419X-2020-26-6-665-675.
8. Sumin AN, Shcheglova AV. Is the concept of type D personality a component of personalized medicine or a prognostic factor in the treatment of cardiovascular diseases? *Russian Journal of Cardiology*. 2020; 25(9): 3996. Russian. https://doi.org/10.15829/1560-4071-2020-3996.
9. Dannemann S, Matschke K, Einsle F, Smucker MR, Zimmermann K, Joraschky P, et al. Is type-D a stable construct? An examination of type-D personality in patients before and after cardiac surgery. *J Psychosom Res* 2010; 69(2): 101-109. https://doi.org/10.1016/j.jpsychores.2010.02.008.

10. Kim SR, Nho JH, Kim JY, Hur J. Effects of a lifestyle intervention based on type D personality in overweight and obese middle-aged women: A feasibility study. *Worldviews Evid Based Nurs* 2020; 17(5): 393-403. https://doi.org/10.1111/wvn.12457.
11. Kato T. Frequently used coping scales: A meta-analysis. *Stress Health* 2015; 31(4): 315-323. https://doi.org/10.1002/smi.2557.
12. Borkoles E, Kaiseler M, Evans A, Ski CF, Thompson DR, Polman RCJ. Type D personality, stress, coping and performance on a novel sport task. *PLoS One* 2018; 13(4): e0196692. https://doi.org/10.1371/journal.pone.0196692.
13. Yamaguchi D, Izawa A, Matsunaga Y. The association of depression with type D Personality and coping strategies in patients with coronary artery disease. *Intern Med* 2020; 59(13): 1589-1595. https://doi.org/10.2169/internalmedicine.3803-19.
14. Lv H, Tao H, Wang Y, Zhao Z, Liu G, Li L, et al. Impact of type D personality on major adverse cardiac events in patients undergoing percutaneous coronary intervention: The mediating role of cognitive appraisal and coping style. *J Psychosom Res* 2020; 136: 110192. https://doi.org/10.1016/j.jpsychores.2020.110192.
15. Pushkarev GS, Kuznetsov VA, Yaroslavskaya EI, Bessonov IS. Reliability and validity of russian version of DS14 score for ischemic heart disease patients. *Russian Journal of Cardiology* 2016; (6): 50-54. Russian https://doi.org/10.15829/1560-4071-2016-6-50-54.
16. Wasserman LI, Iovlev BV, Isaeva ER, Trifonova EA, Shchelkova OYu, Novozhilova MYu, et al. Technique for psychological diagnostic of ways to cope with stressful and problematic situations in a person: A manual for doctors and medical psychologists. St. Petersburg: V.M. Bekhterev St. Petersburg Research Psychoneurological Institute, 2009; 38 p. Russian. http://www.medpsy.ru/library/library142.pdf.
17. Dukhnovsky SV. Diagnostics of Interpersonal Relationships. St. Petersburg: Rech, 2010. 141 p. Russian. https://search.rsl.ru/ru/record/01004404251.
18. Yu XN, Chen Z, Zhang J, Liu X. Coping mediates the association between Type D personality and perceived health in Chinese patients with coronary heart disease. *Int J Behav Med* 2011; 18(3): 277-284. https://doi.org/10.1007/s12529-010-9120-y.
19. Polman R, Borkoles E, Nicholls AR. Type D personality, stress, and symptoms of burnout: The influence of avoidance coping and social support. *Br J Health Psychol* 2010; 15(Pt 3): 681-696. https://doi.org/10.1348/135910709x479069.
20. Kupper N, Denollet J, Widdershoven J, Kop WJ. Type D personality is associated with low cardiovascular reactivity to acute mental stress in heart failure patients. *Int J Psychophysiol* 2013; 90(1): 44-49. https://doi.org/10.1016/j.ijpsycho.2013.01.011.
21. Khaikin AV. To the theory and practice of psychosomatics. Russ Open Med J 2012; 1: 0104. https://www.elibrary.ru/item.asp?id=17905028.
22. Kupper N, van den Broek K, Haagh E, van der Voort P, Widdershoven J, Denollet J. Type D personality affects health-related quality of life in patients with lone atrial fibrillation by increasing symptoms related to sympathetic activation. *J Psychosom Res* 2018; 115: 44–52. https://doi.org/10.1016/j.jpsychores.2018.10.005.

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